Anatomy and Chemistry of the Human Liver Lab Grade Rubric

TOTAL: ________/50

I. Background Information (8 points total)

Answers must be accurate – no credit for incorrectly “attempting” to answer the question.

___ (1 point) Describe the anatomy of the human liver (it’s located in the human body, the number of lobes it is divided into, other pertinent information you discover regarding the anatomy of the liver).

___ (1 point) Describe the physiology of the human liver (summarizes the roles the liver plays in the human body).

___ (2 points) Describe what an enzyme is the human body (Biochemically, what is it made from? What is its general role?).

___ (1 point) Describe the role of a catalyst in a chemical reaction.

___ (1 point) Many chemical reactions in the human body produce the product hydrogen peroxide (H₂O₂). Describe the effects of H₂O₂ on most cells of the human body (is it beneficial, harmful, toxic ...?)

___ (1 point) What is a peroxisome?

___ (1 point) What is the role of the enzyme catalase in a human liver cell?

Deductions: (maximum deductions -8 points)

___ (-4 points) Not answered using complete sentences (used fragmented sentences to answer questions).

___ (-4 points) Not written in paragraph form (author used bullet points or numbered answers).

___ (-8 points) Bibliography or Work Cited not provided.

II. Hypothesis (2 points total).

___ (1 point) If a section of liver (with catalase) is exposed to hydrogen peroxide then the chemical reaction will be (synthesis, decomposition, or exchange) {select one}

___ (1 point) If a section of liver (with catalase) is exposed to hydrogen peroxide then the chemical reaction will be (endothermic or exothermic) {select one}).

Page Total (10 points possible)
III. Experimental Design: (6 points total)

____ (1 point) Design is written in a step by step method.

____ (1 point) Design includes an identifiable control group (everything the same as the experiment except the variable that is being tested – the hydrogen peroxide and liver).

____ (1 point) Design identifies the amount of hydrogen peroxide in mL.

____ (1 point) Design identifies the amount of liver (not “equal pieces.”)

____ (1 point) Design identifies the length of time between recorded temperatures.

____ (1 point) Design identifies the number of repeated trials.

IV. Data (5 points total)

____ (1 point) Data table is in a spreadsheet format with gridlines printed.

____ (1 point) Data table includes control group data (Starting Temperature, Lowest Temperature, Highest Temperature, $\Delta y$, Reaction Rate)

____ (1 point) Data table shows at least three trials of experimental data (Starting Temperature, Lowest Temperature, Highest Temperature, $\Delta y$, Reaction Rate)

____ (1 point) Data table shows the average of each experimental trial: does not include the control data in the average (Starting Temperature, Lowest Temperature, Highest Temperature, $\Delta y$, Reaction Rate)

V. Results (4 points total)

____ (1 point) A line graph with the vertical axis = temperature horizontal axis = time. Be sure to include units.

____ (1 point) The control data is plotted on the graph.

____ (1 point) The three experimental trials are plotted on the graph.

____ (1 point) The graph has a key identifying the control and experimental lines (This may be typed below the graph).

_________ Page Total (14 points possible)
VI. Lab Analysis:

(26 points possible)

___ (2 points) Restate the purpose of this lab.

___ (2 points) Restate the question(s) you are attempting to answer in your experimental investigation.

___ (2 points) State your hypotheses.

___ (2 points) Summarize your results (What types of reactions do you conclude were occurring? What evidence do you have that allowed you to form this conclusion? Be specific and use your results from this lab to justify your answer).

___ (2 points) Accept or Reject your hypotheses.

___ (2 points) Describe two experimental errors that contributed to less than accurate results or introduced unforeseen variables to your experiment.

___ (2 points) Formulate two experimental improvements that would overcome the errors you just described.

___ (2 points) List a NGSS Scientific Practice you performed or conducted in this exercise.

___ (2 points) Describe specifically how you performed this Practice in this lab.

___ (2 points) List a NGSS Common Concept in science/engineering that you observed in this exercise.

___ (2 points) Describe specifically how this Concept was demonstrated.

___ (2 points) Type the correct balanced chemical equation showing the reaction of catalase on hydrogen peroxide. (Remember H2O2 is different from H2O2).

___ (2 points) Describe the lowest and highest temperature observed in this lab using both degrees Celsius and Fahrenheit. For example, during trial two at 90 seconds the sample was 32° C/100° F.

Deductions (maximum deductions is -26 points)

___ (-26 points) Analysis is not typed.

___ (-4 points) Author did not follow the format listed (double spaced, 12 font).

___ (-26 points) Analysis is not typed in paragraph form using complete sentences.

___________ Page Total (26 points possible)
The **purpose** of this lab is to learn and observe some of the complex roles that the liver plays in the human body.

The **questions** you are being asked to answer in this lab are: What role does the liver play in the human body when exposed to hydrogen peroxide (a common product of metabolism) and what types of chemical reactions are taking place?